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# Developing a bioethics education program (BEEP) for teacher education: A qualitative needs analysis

## SUMMARY

Rapid scientific and technological developments increasingly generate bioethical dilemmas affecting decisions about human life, other living beings, and the environment. Addressing such dilemmas requires systematic bioethics education, and teacher education provides an important pathway for fostering ethical awareness in future generations. This study aims to identify prospective teachers' needs regarding the development of a BEEP. Using a basic qualitative design, data were collected through semi-structured interviews with 35 prospective teachers from a Faculty of Education in western Türkiye and analyzed through content analysis. The findings indicate that participants generally have limited prior knowledge of bioethics and lack formal education on the subject. Nevertheless, they emphasized the importance of

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bioethics education for professional development and for fostering an ethically aware society. The identified needs were organized around four components: learning outcomes, content, teaching-learning processes, and evaluation. Participants highlighted competencies related to understanding bioethical concepts, critical thinking, empathy, and ethical decision-making, and emphasized interdisciplinary content, experiential and dialogic pedagogies, and reflective assessment practices. These findings provide an empirically grounded basis for developing a BEEP in teacher education.

**Keywords:** bioethics, bioethics education, prospective teachers, curriculum teacher education, needs analysis.

## INTRODUCTION

### Historical emergence and development of bioethics

Rapid advancements in science and technology have generated complex bioethical dilemmas concerning what is “possible” versus what is ethically “acceptable.” In response to these dilemmas, the concept of bioethics emerged, derived from the Greek words *bios* (life) and *ethos* (morality) (Aşar, 2019; UNESCO, 2016).

The term bioethics was first introduced by German theologian Fritz Jahr in 1927. In his article “Bio-Ethical Imperative,” he emphasized the ethical relationship between humans and other living beings and the need to respect life in all its forms (Jahr, 2010; Steger, 2015). This broader perspective laid the foundation for extending ethical reflection beyond human concerns to the life sciences and environmental contexts (Macer, 2008; Ülman, 2010).

In the 1970s, American biochemist Van Rensselaer Potter further developed the concept by defining bioethics as a bridge between scientific knowledge and human values, particularly in relation to biological research and technological innovation (UNESCO, 2016). Around the same period, Aldo Leopold’s “land ethics” emphasized moral responsibility toward the entire ecological community, including soil, water, plants, and animals (Leopold, 1966). By the 1990s, Macer (1998) described bioethics as a “love of life,” highlighting ethical decision-making that balances benefits and risks to promote good and avoid harm. Over time, bioethics expanded beyond biomedical contexts to encompass the biosphere, integrating perspectives from both natural sciences and the humanities (Agazzi, 2019; Bryant & Baggott la Velle, 2003).

Since the 2000s, bioethics has evolved into a global field shaped by international cooperation, technological developments, and cross-border economic activities (Ten Have & Gordijn, 2014). Contemporary debates increasingly address issues such as social inequalities in access to healthcare and emerging technologies. Recent developments in digital bioethics demonstrate that ethical debates now extend beyond academic and clinical settings into the public sphere (Schneider et al., 2023).

This growing complexity highlights the importance of fostering ethical awareness and critical thinking through education. Thus, bioethics education must move beyond traditional medical ethics to address broader life issues and their societal implications.

### **Contemporary bioethics and bioethics education**

As scientific and technological developments accelerate, ethical dilemmas have become increasingly complex and global in scope, highlighting the need for a deeper understanding of bioethics to guide decisions that sustain life despite sociocultural differences (Lima & Cicovacki, 2014). In this context, international organizations, particularly UNESCO, play a crucial role in developing normative frameworks for addressing bioethical issues worldwide.

A major milestone in this effort was UNESCO's Universal Declaration on Bioethics and Human Rights (2005), which established key principles such as human dignity, autonomy, justice, social responsibility (UNESCO, 2005). These principles provide a global ethical framework, yet their effectiveness depends largely on societal awareness and education. In alignment with the United Nations' Sustainable Development Goals, UNESCO has therefore encouraged the integration of bioethics education at all levels of education (Fischer et al., 2017; UNESCO, 2016).

To support this aim, UNESCO introduced the Bioethics Core Curriculum, originally developed for medical education but designed to be adaptable across disciplines. This initiative reflects the recognition that bioethical issues extend beyond healthcare into broader societal contexts (Thornton et al., 1993). Research indicates that bioethics education can contribute to the development of moral reasoning, ethical decision-making, professional identity, and empathy (Martins et al., 2021; Ten Have & Gordijn, 2014). Similar benefits have also been observed among high school and young adult learners (Gutierrez & Yangco, 2014; Jung & Park, 2015).

Despite these developments, the role of bioethics education in teacher education remains limited. While scholars increasingly emphasize the importance of fostering ethical literacy and critical thinking through education (Dilica, 2021; Robichaux et al., 2022), empirical studies show that many pre-service teachers possess only a superficial understanding of bioethical issues (Hudha et al., 2018). This gap is significant because teachers play a central role in shaping the ethical awareness of future generations, and insufficient preparation in ethical reasoning may undermine the goal of cultivating ethically responsible citizens (González-Blázquez et al., 2024). For this reason, integrating bioethics into teacher education is increasingly recognized as essential. Bioethics education can support prospective teachers in developing ethical awareness, empathy, and responsible decision-making, enabling

them to guide students in navigating complex moral dilemmas (Fischer et al., 2017; Yıldırım, 2016). As Lovat (1994) notes, pedagogical decisions and classroom practices inherently involve ethical considerations. Therefore, systematic bioethics education is necessary to equip teachers with the competencies required to integrate ethical reflection into their professional practice.

### **Bioethics education in teacher education in Türkiye**

Studies examining the academic development of bioethics in Türkiye indicate a growing awareness of the field and its increasingly interdisciplinary nature. An analysis of graduate theses produced between 1997 and 2024 identified studies conducted primarily within social sciences, health sciences, and educational sciences institutes, with research in education largely concentrated in science education programs (Güneş & Erdem, 2025). The prominence of themes such as medical ethics, biotechnology, autonomy, and organ transplantation suggests that bioethics has gradually expanded beyond the exclusive domain of health sciences into broader academic contexts. Scholars also emphasize addressing emerging ethical challenges, such as artificial intelligence, digital health, and global health inequalities, within bioethics education, underscoring that such education should not remain confined to the health sector but should instead promote societal and ethical responsibility more broadly.

Although bioethics education in Türkiye initially developed within medical faculties and health sciences programs, it has gradually extended to other disciplines, including law, engineering, biology, environmental sciences, and teacher education (Arda & Kavas, 2014; Bakar, 2022). Its interdisciplinary nature highlights the potential for integration into fields with strong societal responsibilities, such as teacher education, where engagement with bioethical issues can support prospective teachers' professional development by strengthening ethical reasoning, empathy, and scientific responsibility (Bakar, 2021; Turgut & Yakar, 2020).

Recent structural changes in higher education also create opportunities for such integration. Following the Turkish Higher Education Council's (HEC) 2020 policy change, faculties of education in Türkiye gained greater autonomy to design their teacher education programs (HEC, 2020). This flexibility provides an opportunity to address the limited integration of bioethics in teacher education programs. In this context, the development of a Bioethics Education Program (BEEP) grounded in interdisciplinary perspectives and the development of needs appears particularly timely.

Taken together, these studies suggest that although educational research on bioethics in Türkiye is gradually increasing, its integration across teacher education programs remains limited. In this context, integrating bioethics into teacher education is

increasingly recognized as essential. A systematically designed BEEP has the potential to support prospective teachers' ethical development, strengthen their ability to foster ethical awareness among students, and promote ethical literacy within education.

More broadly, the literature indicates that although bioethics has expanded conceptually and institutionally across multiple disciplines, its systematic integration into teacher education remains limited. Moreover, relatively little research has examined prospective teachers' perspectives on the aims, content, and pedagogical approaches of bioethics education. This gap highlights the need for empirically grounded studies that can inform the development of structured bioethics education initiatives, such as a BEEP, within teacher education.

Curriculum development literature emphasizes that effective programs must be based on systematic needs assessment to identify the competencies learners should acquire (Oliva & Gordon II, 2013; Ornstein & Hunkins, 1998). In the Taba-Tyler model, identifying needs constitutes the first step of curriculum design (White, 1998). Therefore, examining prospective teachers' needs regarding bioethics education is a crucial step for designing a relevant and effective BEEP.

### **Purpose of the study**

Given the growing recognition of the importance of bioethics education and its limited integration into teacher education programs, understanding prospective teachers' perspectives is essential. In particular, identifying their expectations regarding the aims, content, teaching-learning processes, and assessment of such education can provide valuable guidance for program design. Therefore, this study aims to explore prospective teachers' perceptions of bioethics and bioethics education and to identify their needs regarding the development of a BEEP. By identifying these needs through a qualitative needs analysis, this study contributes to the literature by providing empirically grounded insights for the design of bioethics education and the development of context-sensitive bioethics curricula in teacher education.

Accordingly, the study is guided by the following research questions:

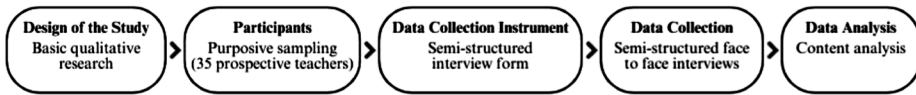
What are the prospective teachers' perspectives on bioethics and its education?

What are the prospective teachers' needs regarding the learning outcomes, content, teaching-learning procedures, and evaluation processes of the BEEP?

## METHOD

This section presents the methodology of the study, as illustrated in Figure 1, with detailed explanations offered in the respective subsections.

Figure 1. Research Methodology



### Design of the study

This study employs a basic qualitative research design (Merriam, 2009). Qualitative research aims to understand individuals' experiences and the meanings they assign to situations through a holistic and flexible perspective (Creswell, 2013; Yıldırım & Şimşek, 2021). It systematically explores how people interpret and construct reality within their contexts (Berg & Lune, 2011). Given the purpose of examining prospective teachers' perceptions of bioethics and their needs regarding a potential BEEP, this approach was deemed appropriate.

### Participants of the study

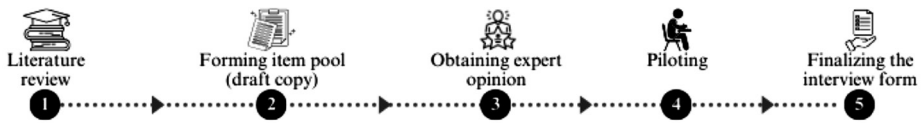
The study was conducted during the 2022-2023 academic year with 35 prospective teachers from a Faculty of Education in Western Türkiye. Participants were selected through purposive sampling (Yıldırım & Şimşek, 2021). The majority were female (68%), and they represented diverse academic backgrounds, being enrolled in nine different teacher education programs: Social Sciences (25.71%), Science (14.29%), Preschool (14.29%), Primary (14.29%), Psychological Counseling and Guidance (11.43%), English (8.57%), Art (5.71%), Elementary Mathematics (2.86%), and Turkish (2.86%), thereby reflecting the interdisciplinary composition of the study group. Senior students were deliberately selected because their proximity to professional practice and teaching internships makes them particularly suitable for reflecting on the practical implications of bioethics education.

Participants were enrolled in different teacher education programs, enabling the study to capture diverse disciplinary perspectives on bioethics education. The sample size was considered adequate for qualitative inquiry, as interviews continued until thematic saturation was reached and additional data no longer yielded substantially new insights.

## Data collection instruments

Oliva and Gordon II (2013) emphasize the use of multiple data collection methods to obtain comprehensive information from relevant stakeholders during a needs analysis. Accordingly, both quantitative and qualitative data were collected from prospective teachers; however, the present study focuses on the qualitative component of this broader needs analysis. Qualitative data were gathered through a semi-structured interview form, the development process of which is illustrated in Figure 2.

Figure 2. Development of Semi-Structured Interview Form



As shown in Figure 2, the interview questions were developed through a review of the relevant literature and refined by an interdisciplinary project team consisting of experts in bioethics, environmental education, science education, biology, and teacher education (Merriam, 2009). To enhance content validity, feedback was obtained from five experts, and the instrument was pilot-tested with four prospective teachers (two females, two males) after which minor revisions were made. The final interview form consisted of two sections: (1) demographic information (gender and teacher education program) and (2) participants' perspectives on bioethics, its integration into teacher education, and their needs regarding a potential BEEP. The semi-structured format allowed participants to elaborate on their experiences and perspectives while ensuring that all key topics relevant to the needs analysis were addressed.

Sample interview questions included: What does the concept of bioethics mean to you? Have you previously received any education related to bioethics? What are your thoughts on providing bioethics education to prospective teachers? Would you be interested in receiving bioethics education as a prospective teacher? Considering a potential BEEP, what are your identified needs regarding its learning outcomes, content, teaching-learning processes, and evaluation?

## Data analysis

The qualitative data obtained in the study were analyzed using MAXQDA 22. In the first stage of content analysis, meaningful units within the data were identified and coded using open and/or in vivo coding (Creswell, 2013; Yıldırım & Şimşek, 2021). In the second stage, these initial codes were further analyzed using axial coding to

develop sub-themes and themes (Gürbüz & Şahin, 2018). The resulting themes and their interrelationships were visualized using MAXMaps (Miles & Huberman, 1994).

### **Trustworthiness**

To ensure trustworthiness, the four criteria proposed by Lincoln and Guba (1985) – credibility, transferability, dependability, and confirmability – were followed. Credibility was enhanced through expert consultation during the research design, development of the interview protocol, data analysis, and interpretation of findings. Data triangulation was achieved by including prospective teachers from different teacher education programs. During the interviews, a supportive environment was maintained and follow-up questions were asked when necessary to obtain rich and accurate data. Audio recordings were transcribed verbatim, and participants were asked to verify the accuracy of the transcriptions.

Two researchers independently analyzed the data at different times, and discrepancies in coding and theme development were resolved through discussion and consultation with an additional expert to ensure analytical rigor (Teddle & Tashakkori, 2009). Transferability was supported by providing detailed descriptions of the research process and context. Dependability was ensured through collaborative decision-making within the interdisciplinary research team during the development of the interview form and other research procedures. To ensure confirmability, direct quotations from participants were included in the findings, and the frequency of themes was reported to illustrate the relative prominence of identified needs (Creswell, 2013; Yıldırım & Şimşek, 2021). In addition, four prospective teachers reviewed the findings to confirm their consistency with the original data.

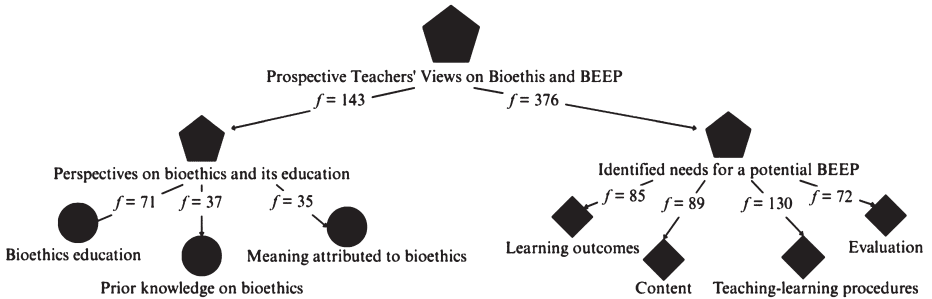
### **Researchers' role**

This study is part of a project aimed at developing a BEEP for prospective teachers. In order to support this goal, the research team is multidisciplinary, bringing together experts in curriculum and instruction, bioethics in medicine, environmental conservation and sustainability, and biostatistics, along with two Ph.D. students specializing in curriculum and instruction.

## **RESULTS**

The findings derived from the qualitative content analysis are presented below. An overview of the main themes emerging from the analysis is provided in Figure 3.

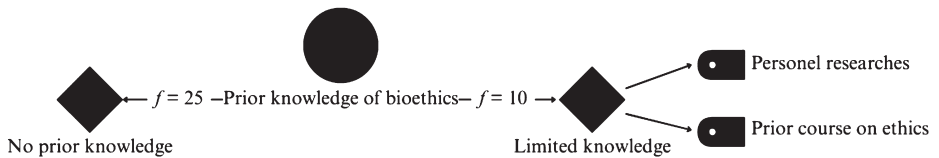
Figure 3. Overview of Themes Identified in the Qualitative Analysis



As illustrated in Figure 3, prospective teachers’ responses converged around two main themes: their perspectives on bioethics and bioethics education ( $f = 143$ ) and their identified needs regarding a potential BEEP ( $f = 376$ ). Overall, the findings reveal a clear gap between prospective teachers’ limited familiarity with bioethics and their strong interest in structured bioethics education, highlighting the importance of developing a systematic BEEP. In line with the research questions, the findings are presented sequentially, first addressing prospective teachers’ perspectives on bioethics and its education, followed by their identified needs regarding the design of a potential BEEP.

The analysis first examined prospective teachers’ prior knowledge of bioethics. The themes derived are presented in Figure 4.

Figure 4. Prospective Teachers’ Prior Knowledge of Bioethics



As shown in Figure 4, the majority of prospective teachers reported having little or no prior knowledge of bioethics ( $f=25$ ). Many participants indicated that they had not previously encountered the concept. As one participant noted, “No, unfortunately, I have never heard of the combination of ethics and bio” (P8). A smaller group of participants reported having only superficial familiarity with the term ( $f=10$ ), often explaining that they had merely heard the concept without a clear understanding. In some cases, participants associated their limited awareness with personal reading or prior coursework related to ethics in education. Taken together, these responses indicate that bioethics remains largely unfamiliar to many prospective teachers, suggesting the need for more systematic exposure to bioethical concepts within teacher education programs.

The analysis next examined how prospective teachers conceptualize bioethics. The themes derived are presented in Figure 5.

Figure 5. Prospective Teachers' Conceptualizations of Bioethics

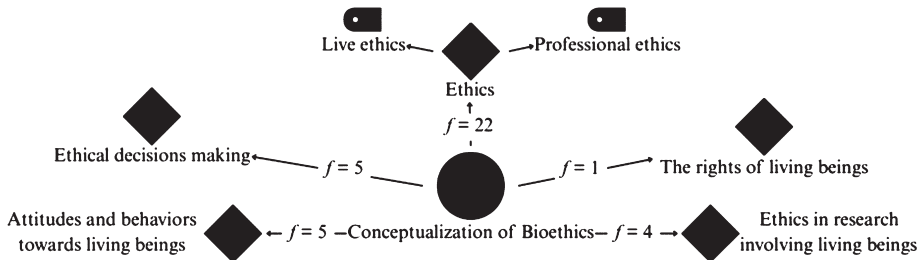


Figure 5 illustrates several sub-themes in prospective teachers' conceptualizations of bioethics, including ethics ( $f=22$ ), attitudes and behaviors toward living beings ( $f=5$ ), ethical decision-making ( $f=5$ ), ethics in research involving living beings ( $f=4$ ), and the rights of living beings ( $f=1$ ).

The most frequently expressed conceptualization framed bioethics as the “ethics of life.” Many participants interpreted the concept by referring to the meanings of its components and emphasizing moral responsibilities toward living beings. As one participant explained, “Bio means life and ethics refers to moral principles, so bioethics is related to the ethics of life and living beings” (P15). In addition, another group of conceptualizations associated bioethics with human attitudes and responsibilities toward living beings, highlighting the importance of considering how humans interact with and treat other living organisms.

A related sub-theme conceptualized bioethics as a process of ethical decision-making, particularly when individuals face complex or conflicting moral choices. One participant described bioethics as “making the most appropriate decision when faced with difficult choices involving moral considerations” (P27). Some participants also conceptualized bioethics in relation to ethical issues in research involving living beings, emphasizing the importance of evaluating whether ethical principles are respected in scientific studies. Finally, a small number of responses referred to the rights of living beings, highlighting the need to recognize and protect the moral status of non-human life forms. Taken together, these findings indicate that prospective teachers tend to conceptualize bioethics primarily as an ethical framework related to life and living beings, although their interpretations remain largely intuitive due to their limited prior exposure to the concept.

The analysis next examined prospective teachers' views on bioethics education and its potential role in teacher education. The themes derived are presented in Figure 6.

Figure 6. Prospective Teachers' Views on Bioethics Education

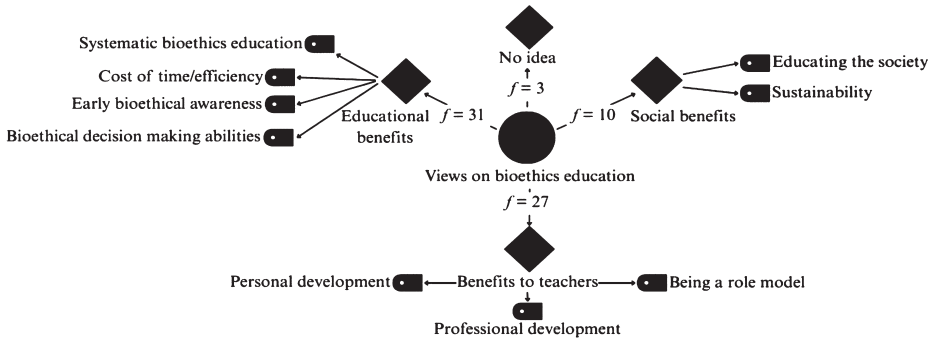


Figure 6 illustrates several themes in prospective teachers' views regarding the incorporation of bioethics education into their training, including educational benefits ( $f=31$ ), benefits to teachers ( $f=27$ ), and societal benefits ( $f=10$ ). A small number of participants reported having no clear opinion on the subject.

The most frequently expressed views emphasized the educational benefits of integrating bioethics into teacher education. Many participants believed that providing bioethics education to prospective teachers could create a multiplier effect in education by enabling teachers to transfer ethical awareness to their students and, indirectly, to the wider community. As one participant explained, “If you educate me, I can educate my students, and they, in turn, can educate their families and friends” (P32). This perspective highlights the perceived potential of bioethics education to promote broader educational outcomes and raise societal awareness.

Another prominent theme highlighted the benefits of bioethics education for teachers themselves, particularly in terms of personal and professional development and the ability to act as ethical role models. Participants emphasized that teachers who receive bioethics education would be better prepared to guide students in addressing ethical issues encountered in everyday life. One participant noted, “A teacher should use this topic in communication with students and in their own life, and they should set an example in this regard” (P31).

Some participants also associated bioethics education with broader societal and environmental responsibilities. In particular, they emphasized that such education could support the development of ethical awareness regarding sustainability and environmental responsibility. One participant highlighted the environmental dimension of bioethics education, stating, “I think this course will help us fulfill our responsibilities toward the environment, which will, in turn, ensure the sustainability of what nature offers us” (P10). Similarly, another participant emphasized the long-term societal impact of early bioethics education, noting that “as a prospective teacher, I will gain the ability to convey this to students from an early age, and these students

will continue their lives as adults with this skill” (P26). Taken together, these findings suggest that prospective teachers view bioethics education not only as beneficial for their own professional development but also as a means of fostering ethical awareness and responsibility among students and society more broadly.

The analysis next examined prospective teachers’ identified needs regarding the development of a potential BEEP. The themes derived are presented in Figure 7.

Figure 7. Prospective Teachers’ Identified Needs for a Potential BEEP



Figure 7 illustrates prospective teachers’ identified needs for a potential BEEP across four key components: learning outcomes ( $f=85$ ), content ( $f=89$ ), teaching-learning procedures ( $f=130$ ), and evaluation ( $f=72$ ). Among these components, needs related to teaching-learning procedures were expressed most frequently, followed by content, learning outcomes, and evaluation. Taken together, these findings indicate that prospective teachers emphasize not only the importance of what should be taught in a bioethics education program but also how such content should be delivered and assessed within teacher education contexts. Each of these components is discussed in detail in the following sections.

The analysis next examined prospective teachers’ identified needs regarding the learning outcomes of a potential BEEP. The themes derived are presented in Figure 8.

Figure 8. Prospective Teachers’ Identified Needs for the Learning Outcomes of a Potential BEEP

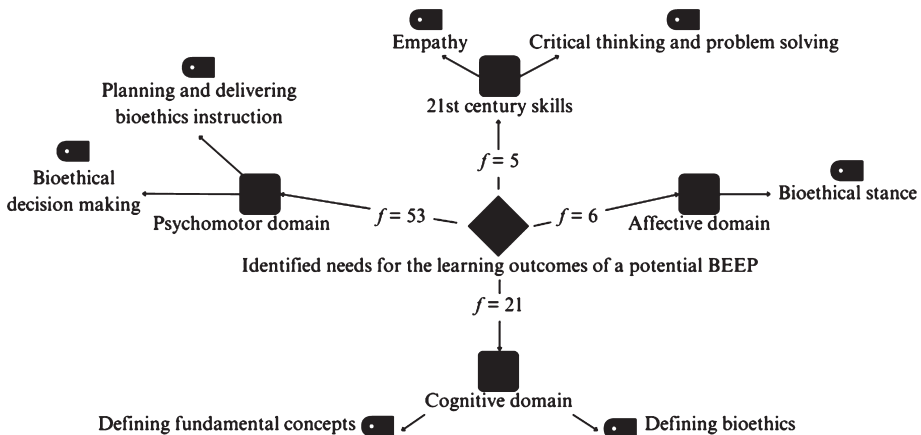


Figure 8 illustrates prospective teachers' identified needs for the learning outcomes of a potential BEEP across three main domains: psychomotor ( $f=53$ ), cognitive ( $f=21$ ), and affective domain ( $f=6$ ), with an additional focus on 21st-century skills ( $f=5$ ).

The most frequently expressed needs were related to the psychomotor domain, emphasizing the development of professional skills for planning and delivering bioethics instruction. Many participants indicated that they would like to be able to communicate bioethical issues effectively to students and others in their social environment. As one participant explained, "After taking this course, I want to be able to explain it clearly to my students or even to family members" (P22). Similarly, another participant noted that "after learning about this, I want to share this information with my students in daily life" (P21), highlighting the expectation that the program should equip teachers with practical skills for integrating bioethics into educational contexts.

In the cognitive domain, prospective teachers emphasized higher-order thinking skills such as ethical reasoning and decision-making when encountering bioethical dilemmas. One participant expressed this expectation by stating, "I would like to be able to make ethical decisions when faced with a bioethical dilemma" (P26). Participants also highlighted the need to develop a clear conceptual understanding of bioethics and its fundamental concepts. For instance, one participant stated that they would like to learn "what bioethics is and what it is not" (P10), reflecting the expectation that the program should provide a solid theoretical foundation.

In the affective domain, participants emphasized the importance of developing bioethical attitudes and awareness. Some prospective teachers indicated that the program should help them adopt and demonstrate a bioethical stance in their professional practice. For example, one participant emphasized the need "to display a bioethical stance as a teacher" (P10), while another highlighted the importance of "raising awareness first and foremost" (P24). In addition, a small number of participants emphasized that the program should foster 21st-century competencies such as empathy, problem-solving, and critical thinking, which they considered essential for addressing complex ethical issues. Taken together, these findings suggest that prospective teachers expect the learning outcomes of a BEEP not only to provide conceptual knowledge about bioethics but also to develop practical teaching skills, ethical reasoning abilities, and values-based awareness relevant to contemporary societal challenges.

The analysis next examined prospective teachers' identified needs regarding the content of a potential BEEP. The themes derived are presented in Figure 9.

Figure 9. Prospective Teachers' Identified Needs for the Content of a Potential BEEP

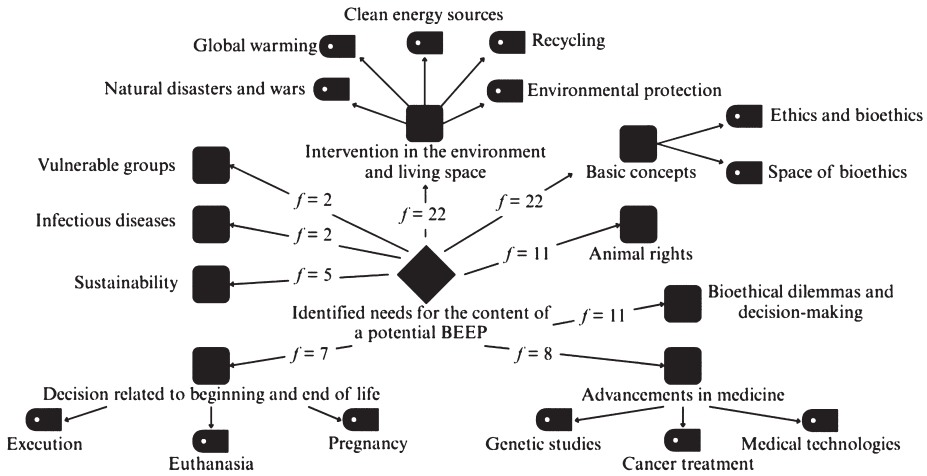


Figure 9 shows that prospective teachers' identified needs for the content of a potential BEEP are grouped into four main sub-themes: basic concepts ( $f=22$ ), intervention in the environment and living space ( $f=22$ ), bioethical dilemmas and decision-making ( $f=11$ ), and animal rights ( $f=11$ ).

Prospective teachers first emphasized the importance of covering fundamental concepts of bioethics, including its definition, scope, and distinction from general ethics. Participants indicated that understanding the theoretical foundations of bioethics was necessary before applying it in practice. As one participant noted, "Without knowing the subject theoretically, I cannot explain it behaviorally or put it into practice" (P7). Participants also highlighted the need to address issues related to environmental interventions and living spaces. Topics such as environmental protection, global warming, clean energy, and sustainability were frequently mentioned as important components of the program. For example, one participant emphasized the urgency of global warming by stating, "The biggest problem right now is global warming, how do we minimize it?" (P32).

Another commonly expressed need concerned the inclusion of bioethical dilemmas and decision-making processes. Participants suggested that the program should present real-life cases and guide prospective teachers through the ethical reasoning and decision-making steps involved in addressing such dilemmas. As one participant explained, "[...] there could be case studies related to bioethics and how we approach these problems and make decisions" (P31). Some participants also emphasized the importance of including topics related to animal rights and ethical considerations regarding the treatment of animals. These responses highlighted the expectation that

bioethics education should address moral responsibilities toward non-human living beings. For instance, one participant suggested that “[...] there could be animal rights [...]” (P28), while another raised ethical concerns about animal experimentation by asking “[...] could experiments be conducted on rapists instead of mice and animals?” (P35).

Additionally, prospective teachers identified the need to address emerging bioethical issues related to advances in medical technologies. Participants emphasized that topics such as genetic technologies, cloning, and cancer research should be included in the program. For instance, one participant stated that “within the scope of bioethics, there could be advances in medicine” (P5), while another expressed interest in discussing cancer research by noting that “[...] I would definitely like to discuss cancer treatment” (P33). Similarly, one participant highlighted the relevance of genetic technologies, stating that “[...] there could be genetic technology; when I think of genes, cloning comes to mind” (P8). Prospective teachers also identified the need to discuss ethical dilemmas related to the beginning and end of life. Participants referred to morally complex situations that require ethical decision-making. For example, one participant described a dilemma by asking, “... there’s a pregnant woman; if she gives birth, she will die, or you are pregnant with twins and have to choose one to give up, what should be done in this situation?” (P1). Other participant questioned the legality of euthanasia by asking “...should euthanasia be legal in our country or not?” (P3).

Finally, participants emphasized the importance of addressing contemporary societal challenges within bioethics education. For example, one participant suggested including pandemic-related ethical issues, stating that “we went through a pandemic; these pandemic-related topics could be included, which children can relate to real life” (P27). Others highlighted the importance of discussing vulnerable groups and global challenges, such as refugee issues and sustainability. One participant noted that “...the issue of refugeeism, which has increased significantly lately, should be addressed” (P15), while another emphasized that “when I think of bioethics, environmental issues come to mind; it is closely related to sustainability” (P9). Taken together, these findings suggest that prospective teachers expect the content of a BEEP to combine foundational bioethical concepts with contemporary ethical issues related to environmental, medical, and societal challenges.

The analysis next examined prospective teachers’ identified needs regarding the teaching-learning procedures of a potential BEEP. The themes derived are presented in Figure 10.

Figure 10. Prospective Teachers' Identified Needs for the Teaching-Learning Procedures of a Potential BEEP

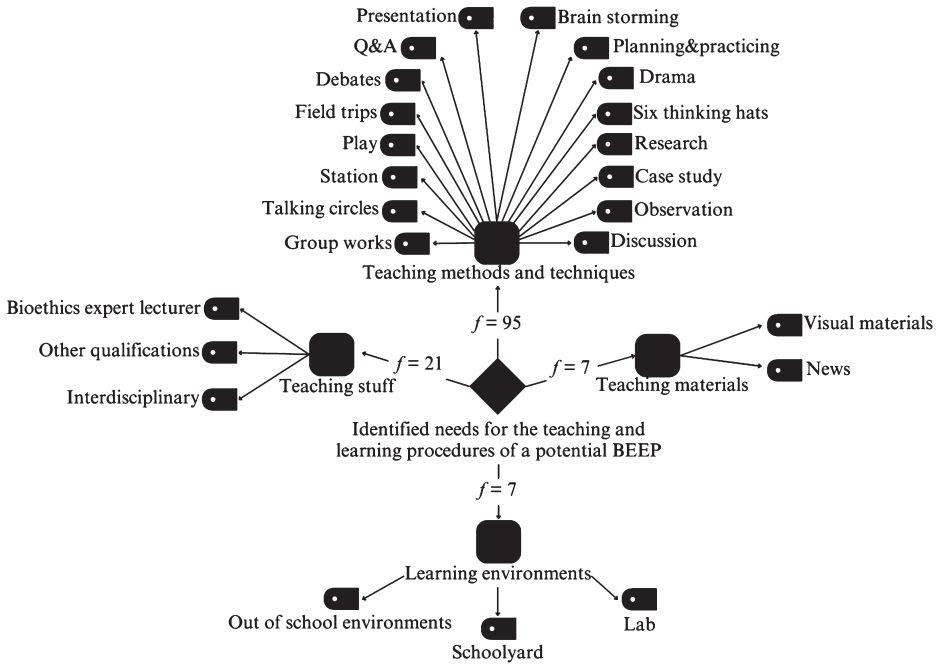


Figure 10 categorizes prospective teachers' identified needs regarding teaching-learning procedures into four main themes: teaching methods and techniques ( $f=95$ ), teaching staff qualified to deliver bioethics education ( $f=21$ ), teaching materials ( $f=7$ ), and teaching-learning environments ( $f=7$ ).

The most frequently expressed needs were related to teaching methods and techniques, with participants strongly emphasizing active learning approaches. Many prospective teachers suggested that bioethics education should be student-centered and interactive rather than lecture-based. As one participant explained, “The process should be student-centered, where students manage the class [...] those who teach should guide us through their own teaching practices” (P32).

Although active learning methods were emphasized, some participants also acknowledged the role of lectures for introducing theoretical aspects of bioethics. However, they stressed that lectures should be combined with interactive activities. For example, one participant noted that “theoretical knowledge is necessary [...] but if it remains just a presentation, it does not attract much interest” (P8). Participants therefore suggested complementing lectures with group research, projects, and collaborative activities to enhance engagement.

Creative drama was also highlighted as a useful technique for addressing ethical dilemmas encountered in everyday life. As one participant explained, “just as we encounter these dilemmas in daily life, they can be dramatized in the classroom using drama techniques” (P4). Participants further suggested incorporating questioning, brainstorming, game-based learning activities and six thinking hats to support students’ active participation in discussions of bioethical issues.

Since participants were senior students engaged in teaching practice, they emphasized the importance of connecting bioethics education with real classroom experiences. Some expressed interest in developing classroom activities during the course and implementing them during their teaching practicum. For example, one participant stated that “if a bioethics course is offered, I would like to implement the activities we develop in this course during the internship” (P8), highlighting the perceived value of transferring course activities to real teaching contexts.

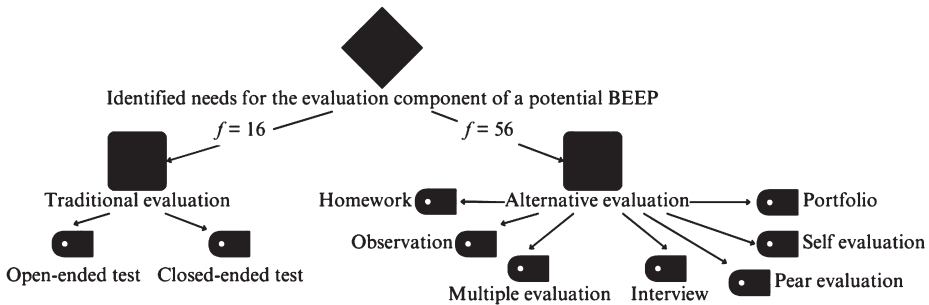
Participants also identified the importance of using diverse teaching materials, including real-life case studies, news reports, videos, and excerpts from media programs addressing bioethical issues. One participant suggested that “real-life case studies, news, or videos could be shown and discussed” (P24). Similarly, another participant emphasized the potential of popular media for exploring bioethical topics, stating that “we often discuss TV series and movies [...] there are many that address bioethical issues, and these can be examined” (P6). These suggestions highlight the importance of varied teaching resources for engaging prospective teachers.

Regarding learning environments, some participants suggested conducting bioethics education beyond the traditional classroom setting. For example, one participant proposed field trips to observe real-world practices, stating that “in topics related to bioethics, field trips could be used to observe what is being done in the field” (P12). Another participant suggested connecting bioethics education with natural environments, explaining that “students can be taken to nature or the zoo [...] I would like bioethics education to interact with real life in this way” (P1).

Participants also emphasized that instructors responsible for the BEEP should possess both pedagogical competence and subject-matter expertise in areas such as ethics, environmental issues, and bioethics. Taken together, these findings indicate that prospective teachers strongly prefer interactive, student-centered teaching approaches supported by diverse instructional materials and authentic learning environments when learning about bioethical issues.

The analysis next examined prospective teachers’ identified needs regarding the evaluation component of a potential BEEP. The themes derived are presented in Figure 11.

Figure 11. Prospective Teachers' Identified Needs for the Evaluation Component of a Potential BEEP



As shown in Figure 11, prospective teachers' identified needs regarding evaluation methods in the BEEP are categorized into two sub-themes: alternative ( $f=56$ ) and traditional ( $f=16$ ) evaluation methods. While some prospective teachers acknowledge the use of traditional evaluation methods, the majority emphasize the need for alternative approaches.

Some prospective teachers identified the use of traditional evaluation methods, such as multiple-choice tests or written exams with open-ended questions. For example, one participant suggested that “perhaps multiple-choice exams could be used” (P31). However, others highlighted the limitations of such formats and emphasized the value of open-ended questions that allow students to express their own views and ethical reasoning. As one participant noted, “it would be good to have an exam, and it would be even better if the questions were open-ended” (P33).

Many prospective teachers emphasized the importance of practice-based and formative evaluation approaches. For instance, one participant suggested that observers could monitor teaching practices during internships and provide feedback, noting that “observers should come and observe during the internship and provide feedback on what could be improved” (P33). Similarly, another participant (P28) proposed evaluating teaching practices through classroom observations or video recordings when direct observation is not possible. These views highlight the perceived importance of evaluating bioethics teaching through authentic teaching experiences.

Prospective teachers also suggested incorporating assignments and process-based assessment tools into the evaluation process. Some recommended projects, weekly presentations, or research assignments as part of the evaluation. Others emphasized reflective and process-oriented tools such as portfolios and interviews. For example, one participant suggested that “portfolios could be used” (P1), while another stated that “face-to-face discussions could be used because written exams alone are not sufficient to measure knowledge” (P7). Taken together, these findings indicate that

prospective teachers predominantly favor alternative and process-oriented evaluation approaches in bioethics education. Although traditional assessment methods were occasionally mentioned, participants generally emphasized that such methods should be complemented by reflective, practice-based, and participatory evaluation strategies.

## **DISCUSSION**

The findings reveal that prospective teachers have very limited or no prior knowledge of bioethics, leading them to define the concept at a basic level, primarily as ethical issues related to living beings, inferred from the term's etymology. This limited awareness appears to be associated with the absence of systematic bioethics education within teacher education programs, both in Türkiye (for example, at Hacettepe University and Marmara University) and internationally (for example, at Harvard University and the University of Toronto), where bioethics courses are predominantly offered within health sciences and medical programs. Previous research has also indicated that bioethics-related course content in Türkiye remains limited and often insufficiently aligned with international bioethics frameworks (Yıldırım, 2016). Similarly, other studies report that teachers and prospective teachers often have limited exposure to bioethics during their training (Kolay, 2022). This may help explain why many prospective teachers in the present study reported little or no prior knowledge of bioethics.

Prospective teachers in the present study nevertheless expressed strong support for the inclusion of bioethics education in teacher preparation programs, emphasizing its potential benefits for both personal development and society. Yıldırım and Çobanoğlu (2009) describe bioethics as a holistic and interdisciplinary field that encompasses ethical issues related to life across multiple domains. In line with this perspective, Thornton and colleagues (1993) advocate for a broader interdisciplinary approach to bioethics education extending beyond health sciences to social sciences. Similarly, Morales-González and colleagues (2018) emphasize the growing need for bioethical decision-making competencies due to rapid technological developments and argue that bioethics education should be integrated more systematically across higher education programs. UNESCO (2016) likewise notes that the Bioethics Core Curriculum, initially developed for medical students, can be adapted for other disciplines, including teacher education. These perspectives further highlight the importance of integrating systematic bioethics education into teacher preparation programs.

Prospective teachers in this study also emphasized that bioethics education should support not only conceptual knowledge but also the development of critical thinking,

empathy for diverse perspectives, and ethical decision-making skills. This expectation reflects the broad and interdisciplinary nature of bioethics, which encompasses ethical issues across medicine, health sciences, genetics, and environmental contexts (Yıldız et al., 2021). This perspective is consistent with previous studies demonstrating that bioethics education strengthens students' critical thinking abilities, ethical reasoning, and respect for different viewpoints (Nunes et al., 2015; Özer-Keskin & Aksakal, 2019). Similarly, Bakar (2021) and Turgut and Yakar (2020) reported that pre-service teachers consider bioethics education valuable for promoting empathy, social awareness, and responsible decision-making. These findings highlight the broader educational role of bioethics in preparing teachers who can guide students in addressing complex ethical issues related to science, technology, and society.

The learning outcomes identified by prospective teachers also reflect the multidimensional nature of bioethics education. In addition to theoretical understanding, participants emphasized the importance of developing practical competencies related to teaching bioethical issues and facilitating ethical discussions in classroom settings. This aligns with research suggesting that effective teacher education programs must integrate subject-matter knowledge with appropriate pedagogical competencies in order to translate ethical concepts into meaningful learning experiences (Darling-Hammond, 2017; Özdemir, 2021). The development of such competencies is closely linked to the structure and quality of initial teacher education programs (Eret-Orhan, 2017; Erginer, 2020) and should be further supported through sustained professional development opportunities (Darling-Hammond et al., 2017).

Building on these learning outcomes, prospective teachers also highlighted two main areas that should be addressed in the content of a potential BEEP: fundamental bioethical concepts and ethical decision-making. Participants emphasized that a strong conceptual foundation is necessary for understanding the ethical dimensions of contemporary life-related issues. Within this framework, they suggested that the program should address topics such as environmental issues, animal rights, the rights of vulnerable groups, developments in medical technologies, sustainability, infectious diseases, and dilemmas related to the beginning and end of life. These topics were considered important examples through which prospective teachers could explore the scope of bioethics and understand how ethical principles apply to real-world situations. This perspective is also reflected in previous studies by Bakar (2021) and Nunes and colleagues (2015).

The scope of these suggested topics also reflects the broader agenda of international bioethics frameworks. For example, the Council of Europe (CoE) Bioethics Committee addresses issues such as genetic testing, organ transplantation, end-of-

life decisions, and emerging biomedical technologies (CoE, 2014). Similarly, the UNESCO Core Curriculum in Bioethics outlines content areas including autonomy, justice, non-discrimination, respect for diversity, and responsibilities toward future generations and the environment (UNESCO, 2016). The content areas identified by prospective teachers in this study therefore align closely with internationally recognized bioethics frameworks, suggesting that a BEEP designed around these needs could both address local educational gaps and align teacher education with internationally recognized bioethics standards.

Although this study is situated within the Turkish teacher education context, the identified needs and pedagogical preferences may also inform the development of bioethics education in other teacher education systems where similar gaps exist. At the same time, bioethics education should remain sensitive to local cultural and societal contexts. Integrating context-specific case examples and ethical dilemmas relevant to Türkiye's socio-cultural landscape is therefore essential for ensuring the program's relevance, accessibility, and long-term impact. As emphasized in the Universal Declaration on Bioethics and Human Rights, respecting cultural diversity and local traditions is a key principle for effective bioethics education (UNESCO, 2005). Similarly, Ten Have and Gordijn (2014) argue that grounding bioethics education in local realities enhances its pedagogical value and fosters deeper learner engagement.

Another important finding concerns the teaching-learning processes expected in bioethics education. Prospective teachers strongly emphasized active learning strategies such as discussions, debates, case studies, creative drama, brainstorming, and collaborative learning activities. These approaches suggest a preference for more interactive and experience-oriented teaching strategies for addressing complex ethical issues. Previous research similarly indicates that engaging students in discussions of ethical dilemmas enhances their understanding while fostering collaboration and communication skills (Kedra & Kourkoutas, 2018). Case-based discussions and experiential learning approaches are also widely regarded as central pedagogical tools in bioethics education because they enable learners to analyze ethical dilemmas and develop ethical reasoning skills (Macer, 2008; Ten Have & Gordijn, 2014). Similarly, Demir-Karabulut and Yıldırım (2018) and Bakar (2021) report that methods promoting active participation contribute to a deeper understanding of bioethical issues. These findings indicate that bioethics education in teacher preparation should prioritize experiential, dialogic, and case-based learning environments that actively engage prospective teachers in the analysis of real-world ethical dilemmas.

Participants also emphasized the importance of using diverse teaching materials in bioethics education, including videos, films, articles, and real-life case examples. The

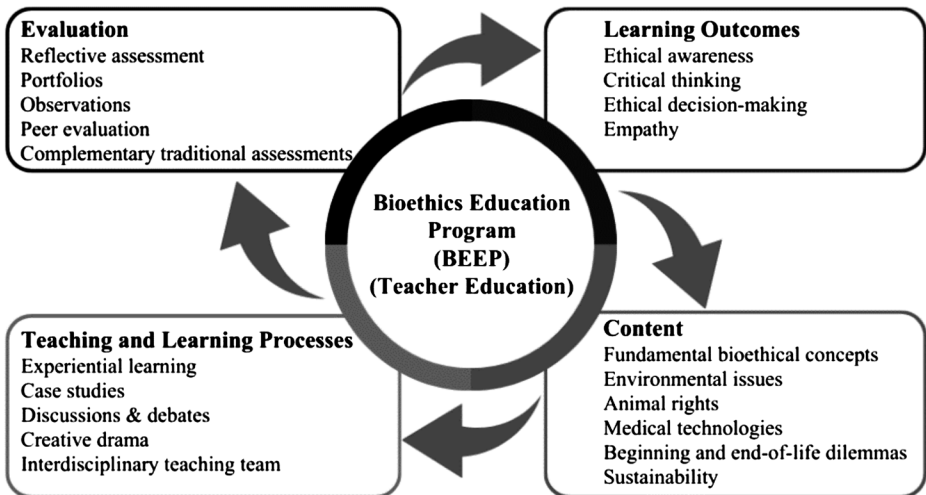
use of varied instructional materials has been shown to enhance students' academic achievement and engagement in learning processes (Kablan et al., 2013). In the context of ethics and bioethics education specifically, visual materials have been found to facilitate students' understanding of complex ethical issues and support more meaningful learning experiences (Demir-Karabulut & Yıldırım, 2018; Gül & Şahinoğlu, 2020). Integrating such materials into bioethics education may therefore support prospective teachers in connecting abstract ethical principles with real-world ethical dilemmas.

Another critical need expressed by prospective teachers pertains to the qualifications of instructors responsible for delivering bioethics education. While some participants favored instruction by a specialist in bioethics, most emphasized the importance of involving experts from various related disciplines. Given the interdisciplinary nature of bioethics, they highlighted that, instructors should possess both domain-specific expertise and strong pedagogical competence. This perspective is supported by Bakar (2021), who noted that effective bioethics teaching requires solid content knowledge, mastery of teaching methods, and a commitment to ethical practice. Building on this view, a collaborative teaching approach may be particularly valuable in bioethics education. In such a model, educators from different fields could contribute their expertise, for example, medical bioethics scholars addressing issues related to the beginning and end of life, environmental experts discussing sustainability and ecological ethics, and educators with pedagogical expertise facilitating active learning activities such as discussion or drama-based approaches. Such a team-based structure may enable bioethics education to integrate diverse disciplinary perspectives while supporting meaningful student engagement with complex ethical issues. Together, these findings point toward a bioethics education model that integrates interdisciplinary content, experiential pedagogies, and collaborative teaching by experts from different fields.

Finally, prospective teachers emphasized that evaluation in bioethics education should rely primarily on alternative and process-based assessment methods. Although traditional examinations may be appropriate for assessing theoretical knowledge, participants suggested that tools such as portfolios, peer evaluation, reflective assignments, and classroom observations may be more effective for evaluating ethical reasoning and engagement with bioethical dilemmas. This perspective is consistent with previous research highlighting the importance of alternative assessment approaches in supporting meaningful learning outcomes (Macer, 2008; Yurdabakan, 2011). These preferences suggest that assessment in bioethics education should extend beyond traditional examinations and incorporate process-oriented and reflective evaluation methods that better capture students' ethical reasoning and decision-making abilities.

The findings of this study point toward a triadic pedagogical structure for bioethics education that combines interdisciplinary content knowledge, experiential and dialogic teaching strategies, and reflective, process-oriented assessment approaches. Building on these findings, the study proposes a conceptual model for integrating bioethics into teacher education through a BEEP. By identifying prospective teachers' educational needs and translating these insights into a structured framework, the study contributes to the literature by offering an empirically grounded perspective for designing bioethics education within teacher preparation programs.

Figure 12. Conceptual Framework for a BEEP in Teacher Education Derived from Prospective Teachers' Identified Needs.



Overall, the findings of this study highlight the potential of integrating a structured BEEP into teacher education to address existing gaps in bioethics knowledge while fostering experiential, dialogic, and case-based approaches to ethical learning. In this sense, strengthening bioethics education in teacher preparation may help future teachers guide students in reflecting on ethical questions concerning humans, other living beings, and the sustainability of life, thereby returning to the fundamental meaning of bioethics as the ethics of life itself.

Conceptually, these results point to a triadic pedagogical structure for bioethics education in teacher preparation, integrating interdisciplinary content, experiential and dialogic pedagogies, and reflective, process-oriented assessment. In this respect, the study contributes to literature by translating prospective teachers' needs into a conceptual framework for designing bioethics education in teacher preparation.

## CONCLUSION

This study examined prospective teachers' perceptions of bioethics and identified their needs regarding the development of a BEEP. The findings indicate that prospective teachers have limited prior knowledge of bioethics, yet strongly support the integration of bioethics education into teacher education programs. Participants emphasized the importance of learning outcomes related to ethical decision-making, empathy, and critical thinking, as well as interdisciplinary content addressing contemporary bioethical challenges.

The findings further highlight the importance of active and experiential learning strategies, diverse teaching materials, and process-oriented evaluation approaches in bioethics education. In addition, prospective teachers emphasized the value of instruction delivered by a team of educators with interdisciplinary expertise related to bioethics and strong pedagogical competencies. Together, these elements suggest that a systematically designed BEEP can provide prospective teachers with opportunities to engage with bioethical issues through experiential, dialogic, and case-based learning processes.

Integrating such a program into teacher education may therefore contribute to strengthening ethical literacy among future teachers and supporting their capacity to guide students in addressing complex ethical questions concerning humans, other living beings, and the sustainability of life. In this way, bioethics education in teacher preparation can play an important role in fostering ethically aware and socially responsible future generations.

Despite these contributions, the study has several limitations that should be considered when interpreting the findings. First, the study was conducted with prospective teachers from a single faculty of education, which may limit the generalizability of the findings to other contexts. Second, the data were based on participants' self-reported perceptions and expectations regarding bioethics education rather than observations of instructional practices. In addition, the study represents the needs analysis phase of a program development process; therefore, a future BEEP has not yet been implemented or empirically evaluated. Future research may examine the implementation and effectiveness of such programs across different teacher education institutions and cultural contexts using mixed-methods or longitudinal designs.

## IMPLICATIONS AND RECOMMENDATIONS

The findings of this study suggest that bioethics education should be integrated into teacher education programs. In Türkiye, the curricular autonomy granted to

faculties of education following the Turkish HEC's 2020 policy change provides an opportunity to incorporate bioethics education into teacher preparation programs. In this context, the conceptual framework derived from the findings of this needs analysis may serve as a basis for the future design and pilot implementation of a BEEP. Following pilot implementation, the finalized BEEP could be incorporated into teacher education programs.

As needs assessment processes benefit from the perspectives of multiple stakeholders, future program development efforts should also involve bioethics experts, teacher educators, and practicing teachers. Furthermore, future studies may expand this research by employing larger and more diverse samples and by using mixed-method approaches across different teacher education institutions both nationally and internationally.

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## Razvoj programa bioetičkog obrazovanja (BEEP) za obrazovanje učitelja: kvalitativna analiza potreba

### SAŽETAK

Brzi znanstveni i tehnološki razvoj sve više stvara bioetičke dileme koje utječu na odluke o ljudskom životu, drugim živim bićima i okolišu. Rješavanje takvih dilema zahtijeva sustavno bioetičko obrazovanje, a obrazovanje učitelja pruža važan put za poticanje etičke svijesti u budućim generacijama. Cilj je ove studije identificirati potrebe budućih učitelja u vezi s razvojem BEEP-a (Bioetičkog programa za obrazovanje). Koristeći osnovni kvalitativni dizajn, podaci su prikupljeni putem polustrukturiranih intervjua s 35 budućih učitelja s Pedagoškog fakulteta u zapadnoj Turskoj i analizirani metodom analize sadržaja. Rezultati pokazuju da sudionici općenito imaju ograničeno predznanje o bioetici i da im nedostaje formalnog obrazovanja o toj temi. Ipak, naglasili su važnost bioetičkog obrazovanja za profesionalni razvoj i poticanje etički osviještenog društva. Utvrđene potrebe organizirane su oko četiriju komponenti: ishoda učenja, sadržaja, procesa poučavanja i učenja te evaluacije. Sudionici su istaknuli kompetencije vezane uz razumijevanje bioetičkih koncepata, kritičko razmišljanje, empatiju i etičko donošenje odluka te su naglasili interdisciplinarni sadržaj, iskustvenu i dijalošku pedagogiju te refleksivne prakse procjene. Ovi rezultati pružaju empirijski utemeljenu osnovu za razvoj BEEP-a u obrazovanju učitelja.

**Ključne riječi:** bioetika, bioetičko obrazovanje, budućí učitelji, kurikulum obrazovanja učitelja, analiza potreba.